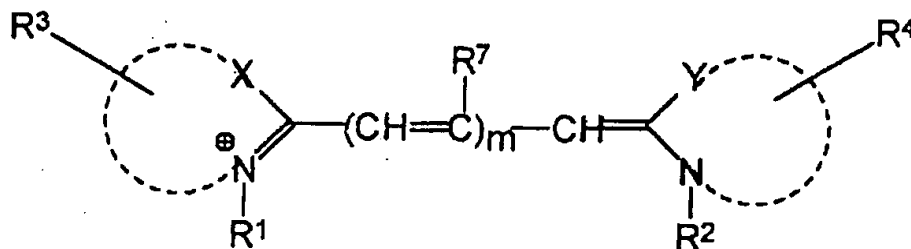


I claim:

1. A method for imparting luminescence to a component which contains or is derivatized to contain an amine, sulhydryl or hydroxy group in a liquid, said method comprising the steps of:

adding to a liquid containing said component, wherein said component is selected from the group consisting of proteins, cells, nucleic acids, sugars, carbohydrates and combinations thereof a luminescent cyanine dye having the structure



wherein:

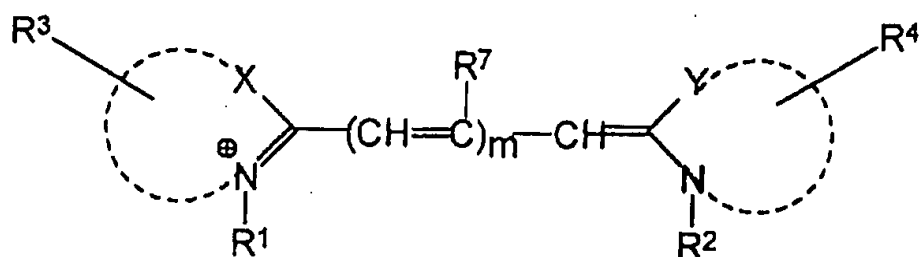
the dotted lines each represent carbon atoms necessary for the formation of said cyanine dye, X and Y are selected from the group consisting of O, S and CH₃-C-CH₃, m is an integer selected from the group consisting of 1, 2, 3 and 4, and at least one of R₁, R₂, R₃, R₄ and R₇ contain a reactive group covalently reactive with amine or hydroxy groups; and reacting said cyanine dye with said component under reaction conditions sufficient for forming a covalent bond between said reactive group and said amine or hydroxy group so that said dye labels said component.

2. The method recited in claim 1 wherein said reactive group is selected from the group consisting of isothiocyanate, isocyanate, phosphoramidite, monochlorotriazine,

dichlorotriazine, mono- or di- halogen substituted pyridine, mono- or di- halogen substituted diazine, aziridine, sulfonyl halide, acid halide, hydroxysuccinimide ester, hydroxy sulfosuccinimide ester, imido ester, glyoxal and aldehyde.

3. The method recited in claim 2 wherein when any of said R_3 , R_4 and R_7 is not a reactive group, said remaining R_3 , R_4 and R_7 are selected from the group consisting of hydrogen, C_1 - C_4 alkyl or the group E-F, a polar group wherein E is a spacer group having the structure $-(CH_2)_n-$ and n of said spacer group is 1, 2, 3, 4 or 5, and F is hydroxy, protected hydroxy, sulfonate, sulfate, carboxyl, or lower alkyl substituted amino; and when any of R_1 and R_2 is not said reactive group, said remaining R_1 or R_2 are a C_1 - C_4 alkyl group or said E-F group and n of said spacer group is 1, 2, 3, 4 or 5.

4. A luminescent cyanine dye comprising a cyanine dye having the structure



wherein:

the dotted lines each represent carbon atoms necessary for the formulation of said cyanine;

X and Y are independently selected from the group consisting of O, S and CH_3-C-CH_3 ;

m is an integer from 1-4;

at least one of the groups R_1 , R_2 , R_3 , R_4 and R_7 is a reactive group, reactive with amino, sulfhydryl or hydroxy nucleophiles; and

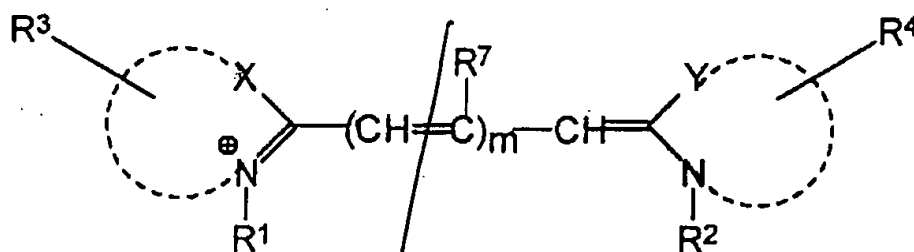
when any of said R_3 , R_4 and R_7 is not a reactive group, said remaining R_3 , R_4 and R_7 are selected from the group consisting of hydrogen, C_1 - C_4 alkyl or the group E-F, a polar group wherein E is a spacer group having the structure $-(CH_2)_n-$ and n of said spacer group is 1, 2, 3, 4 or 5, and F is hydroxy, protected hydroxy, sulfonate, sulfate, carboxyl, or lower alkyl substituted amino; and

when any of R_1 and R_2 is not said reactive group, said remaining R_1 or R_2 are a C_1 - C_4 alkyl group or said E-F group and n of said spacer group is 1, 2, 3, 4 or 5.

5. The cyanine dye recited in claim 4 wherein said reactive group is selected from the group consisting of isothiocyanate, isocyanate, phosphoramidite, monochlorotriazine, dichlorotriazine, mono- or di- halogen substituted pyridine, mono- or di- halogen substituted diazine, aziridine, sulfonyl halide, acid halide, hydroxysuccinimide ester, hydroxy sulfosuccinimide ester, imido ester, glyoxal and aldehyde.

6. A luminescent labeled component comprising:

a component selected from the group consisting of proteins, nucleic acids, cells, carbohydrates, sugars, and combinations thereof having amino, sulfhydryl or hydroxy groups covalently bound to a luminescent cyanine dye having the structure



wherein:

the dotted lines each represent carbon atoms necessary for the formulation of said cyanine;

X and Y are independently selected from the group consisting of O, S and $\text{CH}_3\text{-C-CH}_3$;

m is an integer from 1-4;

at least one of the groups R_1 , R_2 , R_3 , R_4 and R_7 is a reactive group, reactive with amino, sulfhydryl or hydroxy nucleophiles.

7. The component recited in claim 6 wherein at least one of said reactive groups is a phosphoramidite.

8. The component recited in claim 6 wherein said reactive group is selected from the group consisting of isothiocyanate, isocyanate, phosphoramidite, monochlorotriazine, dichlorotriazine, mono- or di- halogen substituted pyridine, mono- or di- halogen substituted diazine, aziridine, sulfonyl halide, acid halide, hydroxysuccinimide ester, hydroxy sulfosuccinimide ester, imido ester, glyoxal and aldehyde; and

when any of said R_3 , R_4 and R_7 is not a reactive group, said remaining R_3 , R_4 and R_7 are selected from the group consisting of hydrogen, $\text{C}_1\text{-C}_4$ alkyl or the group E-F, a polar group wherein E is a spacer group having the structure

when any of R_1 and R_2 is not said reactive group, said remaining R_1 or R_2 are a C_1-C_4 alkyl group or said E-F group and n of said spacer group is 1, 2, 3, 4 or 5.

add A2
add B1